## Trematodes of Marine Fishes from Depth of 200-400 m off Yamagata, the Japan Sea

By

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町田昌昭\*: 山形県沖の海深 200~400 m で得られた魚類の吸虫

Under the Natural History Research Project of the Japanese Archipelago by the National Science Museum, Tokyo, a collection of marine fish parasites was made off Yamagata Prefecture, the Japan Sea, during a period from September 27 to October 4, 1983. Twelve species of trematodes were collected from fishes at a depth of 200–400 m (Table 1), of them the present report deals with five species including two new ones.

Table 1. Trematodes of marine fishes from a depth of 200-400 m off Yamagata Prefecture.

Trematode	Host	Site
Fellodistomidae		
Fellodistomum furcigerum (Olsson, 1867)	Allolepis hollandi	Intestine
Stenakron vetustum Stafford, 1904	"	**
"	Careproctus trachysoma	"
Steringotrema ovacutum (Lebour, 1908)	Hippoglossoides dubius	"
Zoogonidae		
Zoogonoides viviparus (Olsson, 1868)	Hippoglossoides dubius	Rectum
Acanthocolpidae		
Stephanostomum baccatum (NICOLL, 1907)	Careproctus trachysoma	Rectum
"	Dasycottus setiger	Intestine
S. ganko sp. nov.	"	"
Lepocreadiidae		
Neophasis oculatus (Levinsen, 1881)	Careproctus trachysoma	Intestine
N. symmetrorchis sp. nov.	"	,,
Opecoelidae		
Allostenopera pleurogrammi BAEVA, 1968	Pleurogrammus azonus	Intestine
Hemiuridae	•	
Derogenes varicus (Mueller, 1784)	Dasycottus setiger	Stomach
"	Hippoglossoides dubius	"
Genolinea laticauda Manter, 1925	Liparis tanakai	"
Gonocerca kobayashii (Layman, 1930)	Dasycottus setiger	,,

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Trematodes were washed in saline, fixed in alcohol-formalin-acetic acid (AFA) under coverslip pressure, stained with Heidenhain's hematoxylin and mounted in balsam. Specimens are deposited in the collection of the National Science Museum, Tokyo (NSMT).

I wish to express my cordial thanks to Mr. H. SANDÔ, Yamagata Prefectural Fisheries Experimental Station, for providing me facilities to collect the fish parasites.

# A canthocolpidae Stephanostomum baccatum (NICOLL, 1907) (Fig. 1)

This species was obtained from the intestine of Dasycottus setiger and the rectum of Careproctus trachysoma. Ten specimens (NSMT-Pl 2808; Fig. 1) from Dasycottus setiger are: Body elongate club-shaped, 4.0-6.2 mm long and 0.88-1.12 mm wide. Cuticle spinose. Eyespots on both sides of prepharynx. Oral sucker terminal,  $0.18-0.26\times0.26-0.33$  mm, with 45-54 oral spines in two rows. Oral spines in anterior and posterior row  $52~\mu m$  and  $63~\mu m$  long, respectively. Prepharynx 0.24-0.69 mm long. Pharynx  $0.24-0.33\times0.20-0.27$  mm. Esophagus up to 0.34 mm long. Caeca terminating near posterior extremity. Acetabulum  $0.34-0.46\times0.39-0.50$  mm, near midlevel of anterior half of body. Sucker ratio 1:1.33-1.58.

Testes longitudinally elongated, smooth, tandem in posterior half of body; the anterior  $0.52-0.82\times0.43-0.62$  mm and the posterior  $0.59-0.88\times0.45-0.64$  mm. Cirrus pouch extending midway between acetabulum and ovary, containing oval undivided seminal vesicle, small pars prostatica and slender cirrus. Genital pore median, just preacetabular.

Ovary rounded, 0.27– $0.36 \times 0.25$ –0.37 mm, near equator. Laurer's canal opening dorsally near midlevel of ovary. Proximal folds of uterus containing sperms. Uterus intercaecal, preovarian. Uterine eggs thin-shelled, 101– $111 \times 62$ – $70~\mu$ m. Vitelline follicles relatively large, co-extensive with caeca from acetabular level or more posteriorly to posterior extremity.

Thirteen specimens (NSMT-Pl 2828) from Careproctus trachysoma are: Body 3.1–4.4 mm long by 0.86–1.18 mm wide. Oral sucker 0.15–0.25 $\times$ 0.23–0.30 mm with 43–51 oral spines. Oral spines in anterior and posterior row 39  $\mu$ m and 44  $\mu$ m long, respectively. Prepharynx 0.15–0.35 mm long. Pharynx 0.19–0.29 $\times$ 0.21–0.29 mm. Acetabulum 0.28–0.37 $\times$ 0.34–0.43 mm. Sucker ratio 1:1.22–1.63. Anterior testis 0.34–0.55 $\times$ 0.43–0.54 mm and posterior testis 0.38–0.64 $\times$ 0.44–0.61 mm. Ovary 0.20–0.29 $\times$ 0.23–0.30 mm. Uterine eggs 108–119 $\times$ 56–67  $\mu$ m.

Remarks. Yamaguti (1934) described Stephanostomum japonicum as a new species from Dasycottus setiger and Artediellus pacificus caught in Toyama Bay, the Japan Sea. On the other hand, Zhukov (1960) reported S. baccatum (Nicoll, 1907) from Pleurogrammus azonus, Enophrys diceraus namiyei, Myoxocephalus brandti, Gymnacanthus herzensteini, Alcichthys elongatus, Hemitripterus villosus, Liparis sp., Hippoglossoides elassodon dubius, Stichaeus grigorjewi and Gadus morhua macrocephalus caught in Peter the Great Bay, the Japan Sea. Zhukov's S. baccatum is 3.2 to 7.4 mm long, has eggs 92 to 117 by 54 to 71 µm and closely resembles S. japonicum, but only one difference is seen in the number of oral spines, 54 in

the former and 46 in the latter. The present specimens are quite alike both species and have oral spines varing from 43 to 54. According to NICOLL's (1907) original description, S. baccatum is 3.34 mm long, has 56 oral spines, and possesses eggs 87 to 91 by 44 to 53  $\mu$ m. Considerable variation seems to exist in the number of oral spines and the size of eggs. I consider that at least S. japonicum of YAMAGUTI and S. baccatum of ZHUKOV are the same species. I provisionally designate my specimens as S. baccatum.

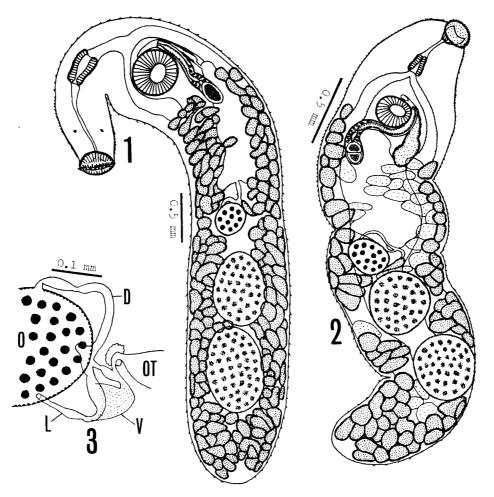


Fig. 1. Stephanostomum baccatum (NICOLL, 1907) from Dasycottus setiger, ventral view.

Figs. 2-3. Stephanostomum ganko sp. nov. from Dasycottus setiger.—2. Entire worm, ventral view.—3. Ovarian complex, ventral view. D, oviduct; L, Laurer's canal; O, ovary; OT, ootype; V, vitelline reservoir.

### Stephanostomum ganko sp. nov.

(Figs. 2-3)

Host. Dasycottus setiger Bean.

Site. Intestine.

Locality. Off Yamagata Prefecture, the Japan Sea.

Specimen No. NSMT-Pl 2809.

#### Masaaki Machida

Based on 24 specimens. Body elongate, 2.00–4.32 mm long and 0.53–0.92 mm wide at equatorial level. Cuticle spinose. Oral sucker terminal, conical, 0.14– $0.23 \times 0.13$ –0.22 mm. Oral spines minute, dot-like, about  $9 \times 6 \mu m$ , total number 130 or more in three rows. Prepharynx 0.06–0.38 mm long. Pharynx subglobular, 0.11– $0.15 \times 0.08$ –0.12 mm, at midlevel of forebody. Caeca bifurcating just posterior to pharynx and terminating near posterior extremity. Acetabulum almost spherical, 0.15– $0.23 \times 0.17$ –0.24 mm, near middle of anterior half of body. Sucker ratio 1:0.95–1.41.

Testes round to oval, tandem in posterior half of body; the anterior  $0.23-0.53\times0.29-0.51$  mm and the posterior  $0.29-0.54\times0.32-0.51$  mm. Cirrus pouch slender, slightly curved,  $0.58-0.80\times0.08-0.14$  mm, extending midway between acetabulum and ovary, containing bipartite seminal vesicle  $0.10-0.26\times0.06-0.13$  mm, small pars prostatica 0.05-0.13 mm long and slender unspined cirrus. Genital pore median, immediately preacetabular.

Ovary nearly rounded,  $0.13-0.28\times0.17-0.29$  mm, slightly dextral to midline, at equatorial. Laurer's canal opening dorsally near level of posterior border of ovary. Proximal coils of uterus containing sperms. Uterus intercaecal, occasionally overlapping caeca, between ovary and acetabulum. Metraterm well-developed, parallel to cirrus pouch. Uterine eggs 13-30 in number, thin-shelled,  $108-119\times72-90~\mu\text{m}$ . Vitellaria stretched from post-acetabular level to posterior extremity of body, largely co-extensive with caeca and confluent in posttesticular region, occasionally before and between testes. Excretory pore terminal; excretory vesicle cannot be traced.

Remarks. The present species closely resembles Stephanostomum microstephanum Manter, 1934 from Epinephelus niveatus off Florida and S. tristephanum McFarlane, 1936 from Ophiodon elongatus off British Columbia in having minute oral spines arranged in three rows. S. microstephanum 1.44 to 2.09 mm long has a cirrus pouch 0.213 mm long extending a short distance posterior to the acetabulum, vitellaria extending from immediately post-bifurcal level, and eggs 62 to 70 by 41 to 43 µm. S. tristephanum 2.6 to 3.1 mm long has a cirrus pouch 0.24 mm long, vitellaria extending from midway between acetabulum and ovary to posterior extremity of body, and eggs 78 to 84 by 39 to 41 µm. Zhukov (1960) reported S. tristephanum of 1.70 mm long with eggs 54 to 58 by 29 to 33 µm from Pneumato-phorus japonicus caught in Peter the Great Bay. The present species differs from the above two species in having a longer cirrus pouch extending midway between acetabulum and ovary, bigger eggs and vitellaria arisen from postacetabular level. Therefore, I regard the present trematode as a new species. The specific name refers to the Japanese name of the host. However, it is not so clear at present whether these characters are valid for identification. More studies on additional specimens may solve this problem.

# Lepocreadiidae Neophasis oculatus (Levinsen, 1881) (Figs. 4-5)

Based on 12 specimens (NSMT-Pl 2827a; Figs. 4-5) from the intestine of *Careproctus trachysoma*. Body nearly foliate, 1.70-2.13 mm long and 0.80-1.04 mm wide near equator.

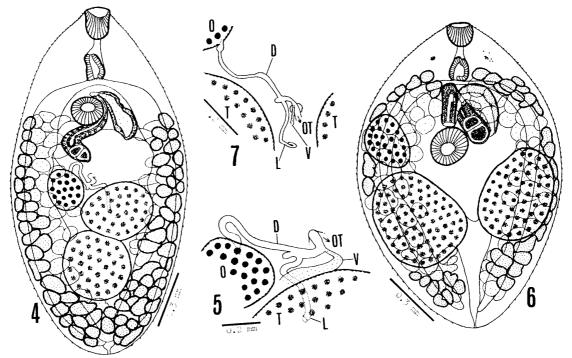
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Cuticle spinose. Oral sucker terminal, wedge- or cup-shaped,  $0.13-0.19\times0.13-0.18$  mm. Prepharynx 0.05-0.14 mm long. Pharynx subglobular,  $0.12-0.14\times0.08-0.11$  mm. Esophagus not recognizable. Caecal bifurcation near midlevel of anterior half of body. Caeca rather wide, terminating near posterior extremity. Acetabulum rounded,  $0.13-0.17\times0.16-0.20$  mm, at junction between anterior and middle third of body. Sucker ratio 1:1.06-1.28.

Gonads postequatorial. Testes round to oval, obliquely tandem or very rarely symmetrical, in contact with each other; anterior testis slightly sinistral,  $0.29-0.40\times0.34-0.43$  mm and posterior testis somewhat dextral,  $0.32-0.43\times0.30-0.45$  mm. Cirrus pouch rather slender, S-shaped,  $0.41-0.61\times0.07-0.11$  mm, extending midway between acetabulum and anterior testis, containing bipartite seminal vesicle  $103-173\times67-90~\mu\text{m}$ , oval pars prostatica  $46-139\times31-49~\mu\text{m}$  and slender cirrus. Genital pore median, immediately preacetabular.

Ovary rounded,  $0.16-0.24\times0.18-0.25$  mm, right to midline, at equatorial level. Seminal receptacle absent. Proximal portion of uterus contains sperms. Laurer's canal opening dorsally near midlevel of anterior testis. Uterus in pretesticular field. Uterine eggs oval, thin-shelled,  $106-116\times67-78~\mu\text{m}$ . Metraterm well-developed, 0.30-0.49~mm long, sinistral to cirrus pouch. Vitelline follicles relatively large, surrounding caeca from acetabular level to posterior extremity of body. Excretory pore terminal; excretory vesicle cannot be traced.

Remarks. Zhukov (1960) obtained Neophasis oculatus from Pleurogrammus azonus, Enophrys diceraus namiyei, Myoxocephalus brandti, Gymnacanthus herzensteini, Alcichthys elongatus, Hemitripterus villosus, Liparis sp., etc. caught in Peter the Great Bay and from Hexagrammos octogrammus, H. lagocephalus and Myoxocephalus brandti caught in southern



Figs. 4-5. Neophasis oculatus (Levinsen, 1881) from Careproctus trachysoma.—4. Entire worm, ventral view.—5. Ovarian complex, ventral view.

Figs. 6-7. Neophasis symmetrorchis sp. nov. from Careproctus trachysoma.—6. Entire worm, ventral view.—7. Ovarian complex, ventral view. D, oviduct; L, Laurer's canal; O, ovary; OT, ootype; T, testis; V, vitelline reservoir.

Kuril waters. He did not describe this trematode in detail, but the measurements of my specimens agree with those of his metarials from *Hexagrammos lagocephalus*, *Myoxocephalus brandti* and *Liparis* sp. Zhukov's figure shows the anterior extent of vitellaria lying at the midlevel of pharynx, but in my specimens it lies at the acetabular level.

### Neophasis symmetrorchis sp. nov.

(Figs. 6-7)

Host. Careproctus trachysoma GILBERT et BURKE.

Site. Intestine.

Locality. Off Yamagata Prefecture, the Japan Sea.

Specimen No. NSMT-Pl 2827b.

Based on 23 specimens. Body oval, 1.42–1.78 mm long and 0.88–1.10 mm wide at equator. Cuticle spinose. Eyespots on either side of prepharynx. Oral sucker terminal, round or cup-shaped when the orifice turns to apex, 0.10–0.15×0.12–0.17 mm. Prepharynx 0.03–0.21 mm long. Pharynx subglobular, 0.11–0.14×0.08–0.13 mm. Esophagus not recognizable. Caeca bifurcating near midlevel of forebody and terminating near posterior extremity. Acetabulum spherical, 0.16–0.23×0.17–0.23 mm, a little anterior to equator. Sucker ratio 1:1.29–1.62.

Testes large, oval, symmetrical immediately posterior to equator; the right 0.42–0.71  $\times$ 0.32–0.45 mm and the left 0.34–0.57 $\times$ 0.32–0.42 mm. Cirrus pouch inverted V-shaped, 0.41–0.85 $\times$ 0.08–0.14 mm, extending posteriorly to mid- or postacetabular level, containing bipartite seminal vesicle 0.13–0.57 $\times$ 0.08–0.13 mm, oval pars prostatica 46–103 $\times$ 28–52  $\mu$ m and slender cirrus. Genital pore median, immediately preacetabular.

Ovary ovoid,  $0.20-0.31\times0.17-0.26$  mm, dextral to acetabulum. Seminal receptacle absent; proximal portion of uterus containing sperms. Laurer's canal opening dorsally some distance posterior to acetabulum. Uterus passing between two testes, reaching near posterior end of testes and then ascending to enter metraterm. Metraterm well-developed, 0.24-0.42 mm long, sinistral to cirrus pouch. Uterine eggs more than 35 in number, oval, thin-shelled,  $121-132\times67-80~\mu\text{m}$ . Vitelline follicles relatively large, surrounding caeca on each side. Excretory pore terminal; excretory vesicle cannot be traced.

Remarks. The genus Neophasis contains three species, N. oculatus (Levinsen, 1881), N. pusilla Stafford, 1904 and N. lageniformis (Lebour, 1910). However, opinion differs as to synonymy between N. pusilla and N. lageniformis. MILLER (1941) and BRINKMANN (1975) considered the two species to be valid, whereas Caballero (1952) reduced N. lageniformis to synonymy with N. pusilla.

The present species closely resembles N. oculatus but differs from it in having an oval body, in the site of acetabulum, testes and ovary, and in the extent of cirrus pouch. Further, the present species differs from N. pusilla (=N. lageniformis?) in having an oval body and large eggs found in large number in the uterus, in lacking a seminal receptacle, and in size and site of testes and ovary.

Zhukov (1960) considered N. lageniformis synonymous with N. oculatus by the testes

changeable in arrangement, from symmetrically to diagonally, during the development. His opinion does not apply to the present species. The present species was found in company with *N. oculatus* in the collected material and both species were fully gravid, having been taxonomically well differentiated.

# O p e c o e l i d a e Allostenopera pleurogrammi BAEVA, 1968 (Figs. 8-10)

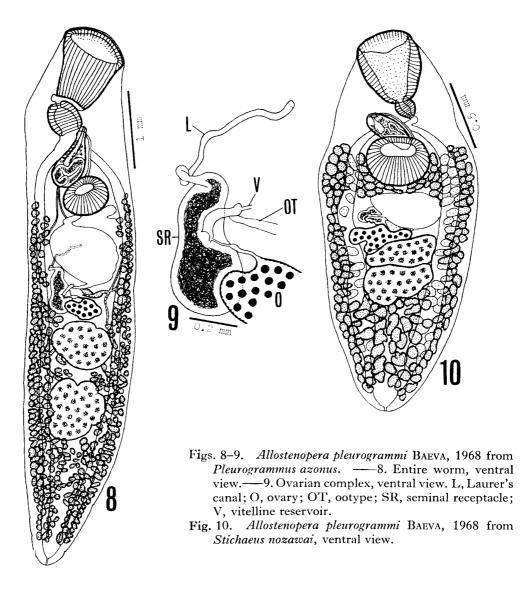
This species was collected from the intestine of *Pleurogrammus azonus*. Additional material was also obtained from *Stichaeus nozawai* at Kushiro and from *Hexagrammos otakii* at Kesennuma, Pacific coast of northern Japan.

Three specimens (NSMT-Pl 2824; Figs. 8–9) from *Pleurogrammus azonus* are as follows: Body elongate, 6.20–7.65 mm long and 1.27–1.50 mm wide at uterine region. Cuticle aspinose. Oral sucker terminal, funnel-shaped, 0.84– $0.94 \times 0.69$ –0.85 mm; prepharynx very short, 0.10–0.19 mm long; pharynx globular, 0.35– $0.42 \times 0.35$ –0.49 mm; esophagus short, 0.15–0.30 mm long; caeca reaching to posterior extremity. Acetabulum spherical, 0.48– $0.58 \times 0.53$ –0.68 mm, near junction between anterior and middle third of body. Sucker ratio 1:0.75–0.80.

Testes subglobular with irregular surface, tandem in anterior part of posterior half of body; the anterior  $0.62-0.65\times0.76-0.81$  mm and the posterior  $0.79-0.81\times0.75$  mm. Each vas efferens ascends forward to enter cirrus pouch. Cirrus pouch claviform,  $0.80-0.94\times0.35-0.46$  mm, extending to midlevel of acetabulum or more posteriorly, containing recurved seminal vesicle, slender pars prostatica with prostatic cells and short cirrus. Genital pore median, immediately prebifurcal.

Ovary subglobular or slightly trilobate,  $0.30-0.35\times0.47-0.56$  mm, median, immediately preequatorial. Seminal receptacle saccular,  $0.42-0.60\times0.25-0.35$  mm, dorsodextral or anterodextral to ovary. Laurer's canal arising from anterior tip of seminal receptacle, winding and opening dorsally midway between acetabulum and ovary. Uterus intercaecal, between ovary and acetabulum. Metraterm thin-walled, sinistral to anterior half of cirrus pouch. Of three specimens, two have eggs of  $54-67\times28-37~\mu\text{m}$  in size and the third has lager ones of  $85-88\times36-41~\mu\text{m}$ , each egg with an unipolar filament. Vitellaria on both sides consisting of relatively large follicles, confined to hindbody, and confluent in the interspace between two testes and in posttesticular region. Excretory vesicle tubular, reaching to midlevel of acetabulum; pore terminal.

Twelve additional specimens (NSMT-Pl 2662; Fig. 10) from *Stichaeus nozawai* taken off Kushiro are slightly contracted and have transversely elongated ovary and two testes adjacent each other. Body 2.4-4.5 mm long by 1.06-1.46 mm wide. Oral sucker sometimes barrel-shaped,  $0.35-0.57\times0.42-0.75$  mm. Pharynx  $0.12-0.19\times0.11-0.22$  mm. Esophagus up to 0.22 mm long. Acetabulum  $0.32-0.54\times0.44-1.60$  mm. Sucker ratio 1: 0.80-1.14. Testes occasionally with deep incisions; the anterior testis  $0.14-0.43\times0.50-0.82$  mm and the posterior  $0.20-0.41\times0.45-0.76$  mm. Cirrus pouch  $0.29-0.44\times0.14-0.14$ 



0.23 mm. Ovary  $0.12-0.25\times0.41-0.58$  mm. Seminal receptacle  $0.12-0.62\times0.13-0.31$  mm. Uterine eggs  $64-88\times36-40~\mu\text{m}$ . Vitellaria sometimes continuous across median line posterior to acetabulum.

Four additional specimens (NSMT-Pl 410) from *Hexagrammos otakii* caught off Kesennuma have a trilobate ovary, and vitellaria sometimes extending anteriorly to the postacetabular level and confluent in the interspace between two testes. Body 2.3–4.0 mm long by 0.54–0.78 mm wide. Oral sucker  $0.49-0.52\times0.49-0.60$  mm; pharynx  $0.22-0.31\times0.21-0.27$  mm. Acetabulum  $0.23-0.32\times0.28-0.35$  mm. Sucker ratio 1:0.57-0.65. Anterior testis  $0.19-0.33\times0.25-0.38$  mm and posterior testis  $0.24-0.37\times0.23-0.38$  mm. Cirrus pouch  $0.33-0.55\times0.13-0.23$  mm. Ovary  $0.13-0.23\times0.18-0.26$  mm. Seminal receptacle  $0.17-0.26\times0.09-0.18$  mm. Eggs  $62-71\times28-31~\mu\text{m}$ .

Remarks. BAEVA (1968) erected the genus Allostenopera to accommodate a single species, A. pleurogrammi BAEVA, 1968, from Pleurogrammus azonus caught in the Japan Sea. In her description, BAEVA (1968) stated that A. pleurogrammi, 3.0 to 8.0 mm in body length

and 50 to 65 by 28 to 38  $\mu$ m in egg size, was characterized in having a large goblet-shaped oral sucker, a cirrus pouch extending to posterior border of the acetabulum, a genital pore lying just posterior to caecal bifurcation, and vitellaria confluent between two testes. My specimens differ from BAEVA's description in some respects, namely, the oral sucker is funnel-or barrel-shaped; the genital pore is situated just anterior to caecal bifurcation; the vitellaria are not always confluent between two testes but sometimes continuous across median line posterior to the acetabulum; and the anterior extent of vitellaria varies from mid- to post-acetabular level in each specimen.

The difference may arise from different hosts, different localities, different fixation, etc. In fact, one of my specimens from *Hexagrammos otakii* has a goblet-shaped oral sucker as in BAEVA's specimens. Goblet-shaped oral sucker may usually appear in specimens fixed after death.

Allostenopera pleurogrammi is quite similar to the members of the genus Helicometra except a well-developed oral sucker of the former. Polyanskii (1955) described Helicometra insolita, 3.0 to 4.5 mm in body length and 71 to 84 by 32 to 38  $\mu$ m in egg size, as a new species from Lumpenus fabricii, L. lampretaeformis and Icelus bicornis caught in the Barents Sea. The oral sucker of this species is highly developed, in form of truncate funnel. It is probable that Allostenopera pleurogrammi is conspecific with Helicometra insolita.

#### 要約

山形県沖の海深  $200\sim400\,\mathrm{m}$  のいわゆるタラバとよばれる漁場でとれたノロゲンゲ、ホッケ、ガンコ、ザラビクニン、アカガレイなどから 12 種の吸虫を採集した(第 1 表)が、このうちの 5 種(2 種は新種)について形態学的な 記載と分類学的な 検討 を行なった。ガンコとザラビクニンからとれた S tephanostomum baccatum は北大西洋からバレンツ海、北西北太平洋に広く分布する種である。ガンコからとれたもう 1 種の S tephanostomum は口吸盤に小さな棘が 3 列並んでおり、近縁の S incrostephanum および S it ristephanum と比較して非常に細長い陰茎嚢と大きな虫卵をもつことなどで新種 S is S anko とした。ザラビクニンからとれた S 種の S Neophasis のうち S incrostephanum および S incrostephanum incrostephanum および S incrostephanum incrostep

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